ATTACHMENT 4

July 28, 2014

MEMO

TO: Mr. Michael P. Crotty, Town Manager

Town of Surfside

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RE: Town of Surfside Sand Analysis

The initial studies involved determining the sand color and size compatibility of the fill material relative to the existing beach sand.

The Munsell Soil Color Charts (1994) are the accepted guide to determine sand color. The nine charts display 322 different standard color chips, but beach sands are typically only in the yellow, yellow-red and red domains, termed Hue. The arrangement of the color chips is three dimensional with the other axes being Value (e.g., whiteness) and Chroma, which is a measure of saturation (with sands typically being more pastel).

Comparison of the sample to the color chip is obtained by holding the sand sample directly behind the apertures separating the closet matching color chip. According to Munsell (1994) "Rarely will the color of the samples be perfectly matched by any color in the chart. The probability of having a perfect matching of the sample color is less than one in one hundred." The key is to find the closest match for each sample.

The fill and beach sand samples from the Town of Surfside were examined in direct sunlight at 4 PM on July 23, 2014 and the following day, which was overcast--the same values were obtained in each case as shown below:

Fill	Beach	Munsell Notation
10 YR	10 YR	Hue
6	7.5	Value
2	2	Chroma

The sand color guidelines for beaches in Miami-Dade County are set according to Sustainability of Re-nourishment RFP No. DACW17-02-R-0031 with the range as follows:

Hue of 2.5 YR, 5 YR, 7.5 YR, 10 YR, 2.5 Y and 5Y (YR = yellow-red and Y = yellow)

Value of 6, 7 or 8 (0 is absolute black and 10 is absolute white)

Chroma of 1, 2 or 3 (scale of 0 to 20 with lower numbers being less saturated, like pastels)

The fill material passes the sand color compatibility test, but the Town of Surfside may want to adopt more stringent criteria for future projects. It is recommended that the sediment from land excavations be washed and screened before being placed on the beach.

The sand size analysis was undertaken by sieve, using US standard sieves of 4 (4.75 mm), 8 (2.36 mm), 10 (2.00 mm), 30 (0.60 mm), 60 (0.25 mm), 80 (0.18 mm), 100 (0.15 mm), 140 (0.11 mm), 170 (0.09 mm), 230 (0.06 mm) and pan. Sieves correspondent to the following grain size:

Screen	Class of Material
4 & 8	Gravel
10	Coarse Sand
30 & 60	Medium Sand
80 & 100	Fine Sand
140, 170 & 230	Very Fine Sand
Pan	Silts and Clays (termed dust when dry and mud when wet)

Six samples were acquired at Surfside beach on Monday, July 21—two each at 96th Street, 92nd Street and 88th Street. The samples were taken within the fill area but avoiding the heavily trafficked backshore area. The fill samples were taken from a depth of 0 to 6 inches, and the beach samples were taken from the same hole at a depth of 24 to 30 inches.

The samples were oven dried, and a mechanical sieve shaker was used to sort the sample by size with the largest size sieve (#4) at the top and the smaller sieve size (#230) and pan at the bottom of the stack. Some of the material in the pan for the fill was so fine that it stuck to the sides of the brass sieves, which were 11 inches in diameter. A sample splitter was used to obtain approximately 100 grams from each field sample for the sieve analysis. The timer for the shaker was set for 15 minutes for each sample. Standard procedures were used to clean the sieves with a brush to obtain the amount retained in each sieve, which was weighed. The attached tables display the sieve data with the most important statistic being the percentage retained on each sieve, which were plotted on three graphs with the fill and beach sample for each street location. The fill material is slightly coarser on average than the beach except for the sample acquired at 92nd Street wherein the beach sample contained more shells.

The criteria for beach compatible material for the State of Florida (62-41.007(1)(j)) shall have a particle size distribution such that:

- Less than 5% of the material by weight shall be retained on the #4 sieve (e.g., gravel)
- Less than 5% of the material by weight shall pass through the #230 size (e.g., silt, clay or colloids)
- Coarse gravel, cobbles or material retained on the ¾ inch sieve (e.g., 19 mm) shall not be in a percentage of size greater than found on the native beach.

Location	Gravel %	Silt/clay/colloid %
96 St Fill	0.89	0.06
96 St Beach	0	0.02
92 St Fill	1.22	0.31
92 St Beach	0.37	0.13
88 St Fill	0.38	0.07
88 St Beach	0	0.20

The fill sand passes the State of Florida requirement for particle size distribution. It should be noted that some residents have found nails and other debris in the fill, but none was found in the three tested samples.